

Replacement Sheet
Title: **LOW-FIRING TEMPERATURE METHOD FOR
PRODUCING AL2O3 BODIES HAVING ENHANCED
CHEMICAL RESISTANCE**
Applicant: Gerard E. Parker
Application No. 10/092,080

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Fig. 3A

Long-Term Corrosion Study of Typical Low-Temperature High-Alumina (LTHA):

<u>MATERIAL</u>	<u>WEIGHT LOSS</u>
ZTA	-70 percent
SiC/SiC	-30 percent
LTHA Sample	-30 percent

Materials Corrosion Test:
Independent Test

Weight loss in mg/dm²/day

46.7% Hydrofluoric (HF) acid @ 25°C

	<u>5 day immersion</u>	<u>35 day immersion</u> (30 after 5)
SiC-Silica flree	1.00	1.00
ZrO ₂ - Toughened	1110.00	1070.00 ⁽¹⁾
Al ₂ O ₃ - 99.9%	1.92	2.26
LTHA Sample (Membrane-approx. 36% porosity)	1.0	0.16 ⁽²⁾
LTHA Sample (Solid)	1.64	0.09

NOTE: Weight loss is listed in mg/dm²/day rounded to nearest 0.0lg.

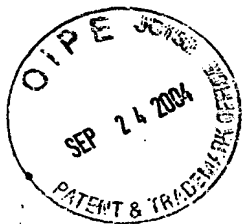
- (1): Approximately 2/3 of the coupon was destroyed in 35 days of testing.
(2): This is a rather severe test in that the surface area is approx. 36% greater than the normal as tested.

Materials Corrosion Test:

50% H₃PO₄ @ 25°C

	<u>Cum. Mg/dm² (approx.)</u>	
	24 Hours	120 Hours
AD90	5.35	9.65
AD94	2.72	5.00
AD96	4.82	12.54
ADO96	5.61	11.59
AD99.5	6.75	10.26
TTZ	0.88	3.33
LTHA Sample	1.66	2.02





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3A

3A

30% NaOH @ 25°C

	<u>Cum. Mg/dm² (approx.)</u>	
	24 Hours	120 Hours
AD90	24.98	51.15
AD94	15.24	32.27
AD96	2.13	6.10
AD096	11.59	14.61
AD99.5	8.23	12.20
TTZ	0.61	0.61
LTHA Sample	1.72	2.01

NOTE: Weight loss is mg/dm²/day, rounded to nearest 0.01g.

Materials Corrosion Test:

	<u>Weight loss in mg/cm²/day</u>	
	60% H ₃ PO ₄ @ 60°C	30% NaOH @ 60°C
A479 Al ₂ O ₃ (90%)	0.15	0.28
A479SS Al ₂ O ₃ (99.5%)	0.07	0.12
3NaI ₂ O ₃ (99.9%)	0.02	0.00
LTHA Sample	0.00	0.00

NOTE: Weight loss is mg/cm²/day, rounded to nearest 0.01 g.

High Alumina Corrosion Test:
 Independent Test

<u>CORROSIVE SOLUTION</u>	<u>HCl</u>	<u>HNO₃</u>	<u>H₂SO₄</u>
<u>MATERIAL</u>	<u>% WEIGHT LOSS</u>		
Product of Manufacturer A:			
85% Al ₂ O ₃	0.066	0.076	0.066
96% Al ₂ O ₃	0.081	0.087	0.200
LTHA Sample	(No Detectable Loss)		
Product of Manufacturer B:			
99.5% Al ₂ O ₃	0.217	0.163	0.216

PROCEDURES

1. Check the initial weight (approximately 5 grams)
2. Immerse into high concentration acid/base solutions
3. Dilute with 50 volume % of distilled water
4. Boil for an hour, and let soak overnight
5. Check the final weight
6. Calculate percent weight loss

$$\% \text{ LOSS} = (\text{INITIAL WEIGHT} - \text{FINAL WEIGHT}) / \text{INITIAL WEIGHT}$$

Fig. 3B